

Drawing Ability, Figural Creativity and Cognitive Style among Chinese College Students in Macau

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Abstract. This study was designed to contribute to the literature, through empirical study of Chinese students' drawing abilities, artistic creativity, creative personality, and cognitive styles to determine their correspondence with literature from other countries. Our participants were 124 first-year undergraduates in Macau recruited from four class sections of an introductory graphic design course. Our major finding is that, among this group, drawing ability is significantly related to creativity and also the major predictor of figural creativity, accounting for a hefty 60% of the variance. However, neither creative personality nor cognitive style had a significant effect on figural creative performance.

Keywords: drawing abilities, artistic creativity, creative personality, cognitive styles, Chinese college students

1. Introduction

Creativity is a common characteristic of distinguished people in the sciences, arts, politics, and business. As such, it may be viewed as a highly desirable quality and an important weapon in coping with life's stresses and problems [1] [2]. For contemporary visual artists and graphic designers, creativity is required for the successful completion of their work [3] [4], but research on the extent to which drawing skills impact figural creativity in these fields is still limited.

Using a pool of art students, McManus et al. [5] found that drawing ability was related to accuracy when copying images as well as to visual memory. Chan and his colleagues [6-9] conducted a series of drawing-skills studies in Hong Kong, and found that students with a greater involvement in drawing activities performed better on spatial tests, and received higher ratings on their drawing abilities when judged by experts. Chan et al.'s results also indicated the existence of a meaningful connection between drawing abilities and creativity, and suggested that drawing skill may be a strong predictor of figural creativity among children, adolescents, and young adults. These observations led us to our first hypothesis:

H1a: Drawing ability is positively correlated with figural creativity.

H1b: Drawing ability can be used to predict figural creativity.

A number of scholars have contributed to our theoretical understanding of personal cognitive styles. Sternberg [10] identified 13 such styles, and Herrmann [11] suggested four modes of thinking styles. Research on the construct of cognitive styles has tended to focus on the identification of patterns in the thinking processes by which people perceive and process information [12]. Although different scholars have proposed a variety of cognitive styles, reflecting this construct's complexity, there is a consensus that cognitive styles are different from thinking styles and that the former should be conceived of as a preference rather than a capacity [13].

Kirton [14] adopted a novel approach to examining the relationships among cognitive styles, creativity, and personality, and developed the Kirton Adaption-Innovation Inventory (KAI) to measure two dimensions

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of cognitive style: innovation (broadly defined as seeking change) and adaption (focused on implementation). He also suggested that creativity is best understood by separating levels (ability, potential) from styles (modality, preferences). Kim [15] conducted a comparison between the KAI and the figural form of the Torrance Tests of Creative Thinking (TTCT) [16] - the most widely used measures of creativity – via confirmatory factor analyses. He found that the TTCT's first style (fluency, originality, and resistance to closure) was related to Kirton's Innovator style, whereas the latter (elaboration, abstractness of titles, and creative closure) was related to Kirton's Adaptor style (for more details, see p. 254). These results seem to suggest an interaction between cognitive styles and creativity.

Two other studies have reported a weak connection between figural creativity and cognitive styles. Palaniappan's [17] research with Malaysian undergraduates found low and non-significant correlations (from $r = .01$ to $.07$) between figural creativity and cognitive preference. The other, with a Brazilian sample, was conducted by Wechsler et al. [12], and identified low but significant correlations (from $r = .22$ to $.27$). However, both of these studies used TTCT, which may fail to capture some important dimensions of figural creativity [18], and this issue deserves further clarification using other figural creativity tests. Thus, the current study utilized an alternative creativity measure, the Test for Creative Thinking-Drawing Production (TCT-DP)[19] to establish the subjects' levels of figural creativity. Two further hypotheses are proposed:

H2a: Cognitive styles are positively correlated with figural creativity.

H2b: A person's cognitive style can be used to predict his/her figural creativity.

A large number of studies have investigated the effects of creative personality on creativity (for a review, see Batey & Furnham, [20]). The search for the shared characteristics of creative people from different socioeconomic groups and across different creative domains has identified a fairly stable set of core traits: wide interests, attraction to complexity, high energy, autonomy, independence, self-confidence, and the placing of high value on aesthetics [1] [2]. The Creative Personality Scale (CPS) [21] is probably the most widely used measure of creative personality [22], and several studies have shown that creative personality as measured by CPS was related to creativity and innovation [23] [24]. For this reason, we hypothesized that:

H3a: Creative personality is positively related to figural creativity.

H3b: Creative personality can be used to predict figural creativity.

The hypotheses sketched out above point to the unique contributions of the present study. Despite the abundance of research on the relationship between creativity and cognitive style, very few researchers have directly differentiated between verbal creativity and figural creativity, or between figural creativity and drawing skills. In particular, we believe that visual artists' drawing skills may have a significant influence on their creative performance. As such, this study was designed to understand the relationships among the drawing ability, figural creativity, and cognitive styles of Chinese students from an undergraduate-level art and design program.

2. Methods

2.1. Participants

Our participants were 124 first-year undergraduates in Macau, China, of whom 52 were male and 72 female. They ranged in age from 18 to 24 year ($M = 19.76$, $SD = 1.26$). The sample was recruited from four class sections of an introductory graphic design course.

2.2. Instruments

Drawing ability. To assess the participants' drawing skill, we used Clark's Drawing Abilities Test (CDAT) [25], which has been tested with more than 5000 elementary-, middle- and high-school students in the U.S. and other countries and shown to be a reliable and valid instrument [7] [9]. The CDAT includes four tasks: (a) drawing an interesting house as if you were looking at it from across the street; (b) drawing a person who is running very fast; (c) drawing yourself playing with your friends in a playground; and (d) drawing a fantasy picture from your imagination. The scoring of these tasks is based on four criteria: originality, expressiveness, creative solutions, and drawing skills. Because of the nature of the current study, the fantasy-drawing task was assigned greater prominence.

Figural creativity. The TCT-DP used to evaluate the participants' figural creativity, was designed to evaluate creative thinking via analysis of drawing production. Participants are given six fragments to encourage them to complete an imaginative or innovative drawing. In particular, the test embodies a holistic approach to creative production and focuses on the final shape or form (in German, "Gestalt") of the end product, as well as how it was shaped. The scoring of TCT-DP is broken down into 11 key elements including *boundary breaking*, *unconventionality*, *new elements*, and *humor*, each being awarded a maximum of six points. The creativity score is computed as the sum of these various sub-dimensions. Urban and Jellen [26] reported that the reliability of TCT-DP was between .88 and .97, and further evidence on the validity of this measure has been provided by Chae [27].

Cognitive style. The KAI contains 32 statements answered via 5-point scale ranging from 1 (*item does not describe me well*) to 5 (*item describes me well*). The possible range of scores is therefore from 32 to 160, and the higher the score, the more innovative the test-taker's orientation. As well as the innovative personality type, the KAI tests for three dimensions: Rule/Group Conformity (R), indicating a person's adherence to group norms; Efficiency (E), which concerns the detail and reliability; and Sufficiency of Originality (SO), referring to the tendency to brainstorm creative ideas. Kirton [14] reported that the test's reliability was .88 and its test-retest reliability .82. Evidence for its construct-, content-, and criterion validity was provided by Bobic, Davis, and Cunningham [28].

Creative personality. The CPS, a very popular measure in the cognitive-style and personality literature [29][30], contains 30 adjective checklist items, of which 18 are positively weighted (i.e., indicators of a creative person) and 12 are negatively weighted (indicators of a non-creative person). According to Gough's [21] scoring protocol, one point is awarded each time one of the 18 positive items is checked, and one point is subtracted each time one of the remaining 12 negative items is checked. Thus, the CPS has a theoretical range of scores from -12 to +18. Based on a pool of 1701 individuals, Gough reported alpha coefficient reliabilities ranging from .73 to .81, and Meneely and Portillo [30] have provided additional evidence bearing on the validity of this measure.

2.3. Scoring

Two researchers have discussed the potential for using of Amabile's [18] Consensual Assessment Technique (CAT) as a scoring method on the CDAT and the TCT-DP. In Chan's [7] study, two Hong Kong visual artists were invited to judge students' drawing skills on a 3-point scale. Dollinger [31] followed the CAT procedure and recruited three graduate MFA students to judge drawing products. As a result of the success of these two experiments, students' drawing scores and creativity scores in the present study were evaluated via the CAT. The three domain experts we selected, two male and one female, were all instructors in the same department of art and design as the student participants. Guided by the protocol established by Niu and Liu [32], our judges first classified all the participants' works into three groups – low, moderate, and high – according to their levels of drawing skills and creativity. Then, the judges provided global ratings of drawing ability and creativity for each student, ranging from 1 (*very low*) to 5 (*very high*). Inter-rater reliability was assessed via Cronbach's alpha, which was .782 for creativity and .809 for drawing ability. An individual's index of creativity and drawing ability was the average of the scores assigned by the three experts.

2.4. Procedure

Potential participants were approached in their university classrooms and informed of the purpose of the study. Those who volunteered to participate and completed all four tasks received extra course credits for their contribution to the current study. For the first two drawing tasks (CDAT and TCT-DP), each student was provided with a package of testing material and pencils and allowed up to 10 minutes to finish. Then, the participants were given an additional period of 10 minutes in which to provide their background information (e.g., gender and age) and complete the KAI and CPS.

2.5. Results

As shown in Table 1, we used Pearson correlations to examine the means, standard deviations, and intercorrelations among drawing skills, creativity, cognitive styles, and creative personality. Only creativity

was significantly related to drawing, $r = .60, p < .01$. Neither CPS nor KAI was significantly related to creativity. Interestingly, among these relationships, only CPS was negatively related to creativity, $r = -.02$. Based on these findings, H1a was supported, while H2a was partially supported, insofar as the correlation between cognitive style and creativity was positive but not significant, $r = .10$. Finally, H3a was rejected, because for our sample, creative personality was negatively related to figural creativity.

Table 1 Means, Standard Deviations, and Intercorrelations for Scores on Four Measures

Measure	M	SD	1	2	3	4
1. CPS	4.67	4.15	--			
2. KAI	110.84	11.95	.10	--		
3. Creativity	2.38	1.11	-.02	.10	--	
4. Drawing	2.49	1.04	.02	.04	.60**	--

** $p < .01$.

In addition, we used multiple linear regression with enter method to estimate the extent to which the participants' scores for creative personality, cognitive style, and drawing ability could predict their figural creativity. The model indicates that $F(3, 120) = 22.57, p < .001$, and Table 2 shows that drawing ability was the only variable capable of predicting creativity, $b = .63, \beta = .59, p < .001$. Drawing ability also explained 60 % of the variance in this model. These results support H1b, and lead us to reject both H2b and H3b.

Table 2 Regression Analysis Summary for Three Variables Predicting Creativity

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
CPS	-.01	.02	-.04	-.60	.553
KAI	.01	.01	.08	1.04	.299
Drawing	.63	.08	.59	8.11	<.001

Note. $R^2 = .60$ ($N = 124, p < .001$).

3. Discussion

Before proceeding to discuss the present study's findings, certain limitations should be noted. First, the present study was based on global ratings of creativity assigned by judges, and it should be recognized that a number of variables might influence creativity, such as quality and originality. Second, the sample was recruited from a single institution and cultural group; as such, further studies of a cross-cultural nature are needed. Finally, the present study was based on a correlational paradigm, whereas a classic experimental paradigm would tend to yield firmer conclusions.

This study was designed to contribute to the literature, in part, through empirical study of Chinese students' drawing abilities, artistic creativity, creative personality, and cognitive styles to determine their correspondence with literature from other countries.

Our first major finding is that, among this group, drawing ability is significantly related to creativity and also the major predictor of figural creativity. Several prior studies have examined the relationship between technical/drawing skills and creativity, with mixed results. For example, Clark and Zimmerman [25] found a weak correlation between these factors ($r = .21, p < .05$) when they studied people aged 18-24 in the U.S., whereas Chan and Zhao [9] found a moderate correlation (from $r = .53$ to $.68, p < .001$) among children, adolescents, and young adults in Hong Kong. In the current study the correlation between drawing ability and creativity was moderate, $r = .60, p < .01$.

Secondly, according to our regression model, drawing ability seems play a significant role in judges evaluations of participants' creativity: accounting for a hefty 60% of the variance. This finding suggests that, when it comes to figural creativity, technical skill and especially drawing ability can impact experts' perceptions of an individual's creative performance; the better the drawing skills, the higher the creative-performance scores. In short, for designers and artists, having creative ideas is not enough; they also need refined skills if they are to execute their ideas in a manner that fulfills their potential.

Thirdly, neither creative personality nor cognitive style had a significant effect on figural creative performance. The most likely explanation for this unexpected finding may be that previous studies on this topic often measured creativity via divergent thinking or self/other-ratings [33], whereas in the current study it was scored via figural creativity as evaluated by three judges. Future research they should therefore continue in this direction, i.e., using real-life creative performance (or reasonable simulations thereof) to assess the influence of personality traits and cognitive styles on figural creativity.

In summary, this study attempted to extend our knowledge of the relationships among figural creativity, drawing skill, creative personality traits, and cognitive style to the Chinese cultural setting. Our findings with Chinese art and design college students indicated that there was a significant, positive, and substantial correlation between drawing skill and figural creativity; and the results of regression analysis further suggest that the higher the level of his/her drawing skill, the more likely a participant was to be seen as expressing a high level of creativity.

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